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# noise abatement

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" " Noise abatement

fullerton  
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development services department



NOISE ELEMENT  
OF THE CITY OF FULLERTON  
GENERAL PLAN

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Prepared by: J. J. VAN HOUTEN & ASSOCIATES

Adopted October 15, 1974

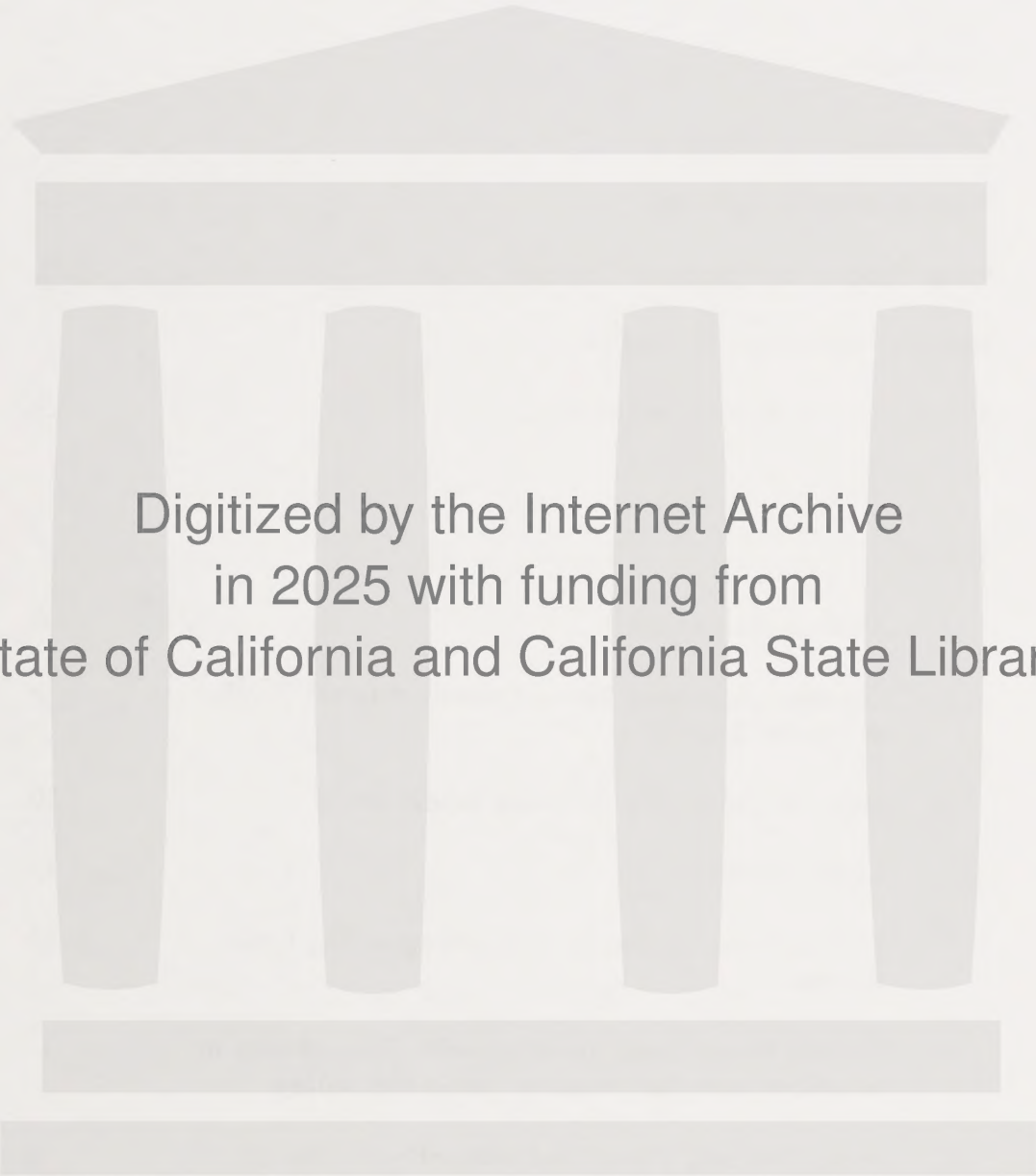


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## INTRODUCTION

The City of Fullerton contracted with the firm of J. J. Van Houten & Associates to conduct a noise study, with special emphasis on the airport, and to prepare a draft of a noise element.

The study included noise measurements and analysis and the establishment of Community Noise Equivalent Level (CNEL) contours for the City. These contours provide the composite of noise produced within the City by traffic on the highways, train movements, Fullerton Municipal Airport operations, and the related aircraft movements over a portion of the City. Sample noise level recordings are provided which exemplify representative highway, railway, commercial/industrial, and aircraft elements.

The three major sources of noise with impact upon residences are the freeways, the airport, and the railroad. As it happens, all three sources are controlled by other agencies, however, measures can be taken to reduce the impact of these noises through building standards and the use of buffering either by zoning or actual construction of noise buffers.

The noise element establishes goals and policies to prevent increases and, where possible, reduce the exposure to community noise. Implementation of these goals and policies will require a noise ordinance for the control of noise in residential areas as well as in everyday actions where appropriate measures can be taken.





## BACKGROUND

Noise is defined as unwanted sound. It is an undesirable by-product of transportation elements and commercial and industrial activities within the community. Annoyance caused by noise is more often experienced the most by those that benefit the least from its cause. A neighbor's home air conditioner, a passing motorcycle or an aircraft fly-over are but a few examples of this disturbance to our urban environment.

In general, noise is not considered a significant environmental problem within the City of Fullerton. However, this generalization may not prove comforting to the individual subjected to the shrill of a motorcycle, "hard rock music" from a nearby tavern while in the repose of his living room, or the periodic passing of squealing boxcars and the sounding of a train warning signal. Recognizing the nature of this environmental factor, California State Law\* requires that each city include a Noise Element in its General Plan.

### A. Primary Goal

The primary goal of this Element is stated as follows:

...to protect the health and welfare of the community through the identification and control of noise pollutants.

In order to work toward the achievement of this goal, noise measurements were obtained at locations throughout the City which were analyzed to establish existing noise levels and noise exposures within the community. In addition, contours of equal noise exposure have been derived and mapped. These contours provide the projected noise exposure due to traffic on the arterials, train movements and flight operations from Fullerton Municipal Airport. A program to eliminate, mitigate and control intrusive noise was then prepared.

### B. Planning Guidelines or Objectives

To achieve the primary goal of the Noise Element of the General Plan, the following objectives are considered essential:

#### 1. Residential Zones

- (a) Residential areas must be generally quiet.
- (b) Residential areas should be quieter at night than during the daytime.

\* California Government Code, Chapter 775, Section 65302 (g).

- (c) Residential areas should be quieter than commercial and industrial areas.
- (d) The interiors of residential structures should be substantially free from external noise. This includes all residential development regardless of density or dwelling type.
- (e) Noise levels transmitted beyond or across a residential property line should be limited to the noise level considered acceptable in the receiving zone.

## 2. Commercial Zones

- (a) The noise level permitted in commercial zones may exceed that of a residential area but should be less than that of an industrial area.
- (b) The noise level in commercial areas should not interfere with normal business activity.
- (c) Noise levels transmitted beyond or across a commercial property line should be limited to the noise level considered acceptable in the receiving zone.

## 3. Industrial Zones

- (a) Noise levels within industrial zones may be higher than that in residential and commercial zones.
- (b) Noise levels within a building should be in compliance with State and Federal Health and Safety regulations.
- (c) All areas of an industrial building to which the public has general access should be acoustically protected so as to limit the noise level in those areas to that of a commercial zone.
- (d) Noise transmitted beyond or across an industrial property line should be limited to the noise level considered acceptable in the receiving zone.

## 4. Special Land Use

- (a) Schools, hospitals, libraries, churches and convalescent homes should be protected from excessive noise.



- (b) In general, the noise levels in and around these special land use structures, should be no greater than is considered acceptable in a residential zone.

## 5. Circulation Elements

- (a) Recognizing that the City does not have control over vehicle noise standards due to State preemption, the City should require that noise protection and mitigating residential and commercial designs be provided along the major traffic routes in accordance with the uses permitted.
- (b) Truck traffic should not be permitted in residential zones except on designated truck routes or unless making deliveries within the area.
- (c) New residential developments should not be permitted where traffic generated noise levels already exceed the residential zone noise level, unless that residential development contains means for the mitigation of noise.



## NOISE EVALUATION CRITERIA

A description of the character of a particular noise requires at least the following:

1. Amplitude and amplitude variation of the acoustic wave;
2. Frequency (pitch) content of the wave motion; and
3. Duration of the noise.

The scale of measurement which is most useful in community noise measurement is the A-weighted sound pressure level, commonly called the A-level or dB(A). This noise measure, its application to a measure of noise exposure, and its utility in the description of ambient noise levels, are discussed in the remainder of this section.

### A. A-Weighted Sound Pressure Level

Throughout this element, the magnitude of noise is indicated by application of the generally recognized measure: The A-level or dB(A).<sup>\*</sup> This measure of noise corresponds approximately to the relative annoyance produced by noise at various frequencies.

### B. Acceptable Ambient Noise Levels

In general, it must be recognized that noise is objectionable, and under certain conditions may affect the average individual in any of the following ways:

1. General hearing loss or damage;
2. Impaired hearing for speech communication;
3. Interference with one's ability to understand oral communication;
4. Sleep interference; and
5. Contributes to nervousness and tension.

<sup>\*</sup> A-level or dB(A) is twenty (20) times the logarithm to the Base ten (10) of the ratio of the A-weighted sound pressure to a reference pressure of twenty (20) micro-newtons per square meter.



Noise levels which exceed 85 dB(A) are generally considered to contribute to hearing loss. When experienced for long durations during each working day, an individual may experience severe temporary or even permanent hearing loss. State and Federal Health and Safety Regulations currently protect workers at levels of exposure which exceed 90 dB(A) for each eight (8) hour work day.

Speech communication and speech intelligibility is impaired at levels from 60 to 70 dB(A). Sleep interference may be experienced at noise levels in excess of 35 dB(A). Generally accepted standards consider noise levels above 45 dB(A) to be unacceptable for sleeping spaces.

The League of California Cities recommends that the community ambient noise level of all background sounds should not exceed the values indicated in Table I. The Primary Goal as stated in the Section entitled "Background" should be interpreted to at least maintain ambient noise levels considered "quiet" to most reasonable people, as indicated in Table I.

C. Noise Exposure - Community Noise Equivalent Level

A given level of noise may be more or less tolerable, depending on the duration of exposure experienced by an individual. There are numerous measures of noise exposure which consider not only the A-level variation of noise, but also include the duration of the disturbance. The State Department of Aeronautics has adopted the Community Noise Equivalent Level (CNEL) measure of exposure.\* This measure considers an average A-weighted noise level increased by 5 dB for the evening hours from 7:00 P.M. to 10:00 P.M. and increased by 10 dB for the late evening and morning hours from 10:00 P.M. to 7:00 A.M. The daytime noise levels are combined with these weighted levels and averaged to obtain a CNEL value. A comparative description of outdoor CNEL values is provided in Table II.

The interpretation of the previously cited CNEL values in terms of land use suitability are indicated in Table III. Recently, a State agency has applied the CNEL measure to the evaluation of noise impact near highways and rail-ways.

D. Acceptable Interior & Exterior Noise Exposures

California's new noise and energy insulation standards, mandated by the Legislature to be in effect this year, were officially adopted by the California Commission of Housing and Community Development at a public hearing held February 22, 1974. The ruling states:

\* California Government Code, Title 4, Sub-Chapter 6, Noise Standards.

"Interior Community Noise Equivalent Levels (CNEL) attributable to exterior sources shall not exceed an annual CNEL of 45 dB in any habitable room."

TABLE I: AMBIENT NOISE LEVELS

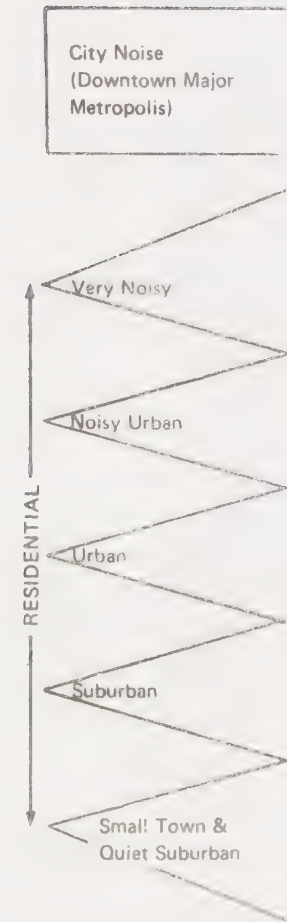
| <u>ZONE</u>  | <u>TIME</u>  | <u>QUIET</u> | <u>SLIGHTLY NOISY</u> |
|--------------|--------------|--------------|-----------------------|
| Residential  | 10 pm - 7 am | 45 dB(A)     | 50 dB(A)              |
|              | 7 pm - 10 pm | 50           | 55                    |
|              | 7 am - 7 pm  | 55           | 60                    |
| Multi-Family | 10 pm - 7 am | 50 dB(A)     | 55 dB(A)              |
|              | 7 am - 10 pm | 55           | 60                    |
| Commercial   | 10 pm - 7 am | 55 dB(A)     | 60 dB(A)              |
|              | 7 am - 10 pm | 60           | 65                    |
| Industrial   | anytime      | 70 dB(A)     | 70 dB(A)              |

Source: League of California Cities, Quiet City Report

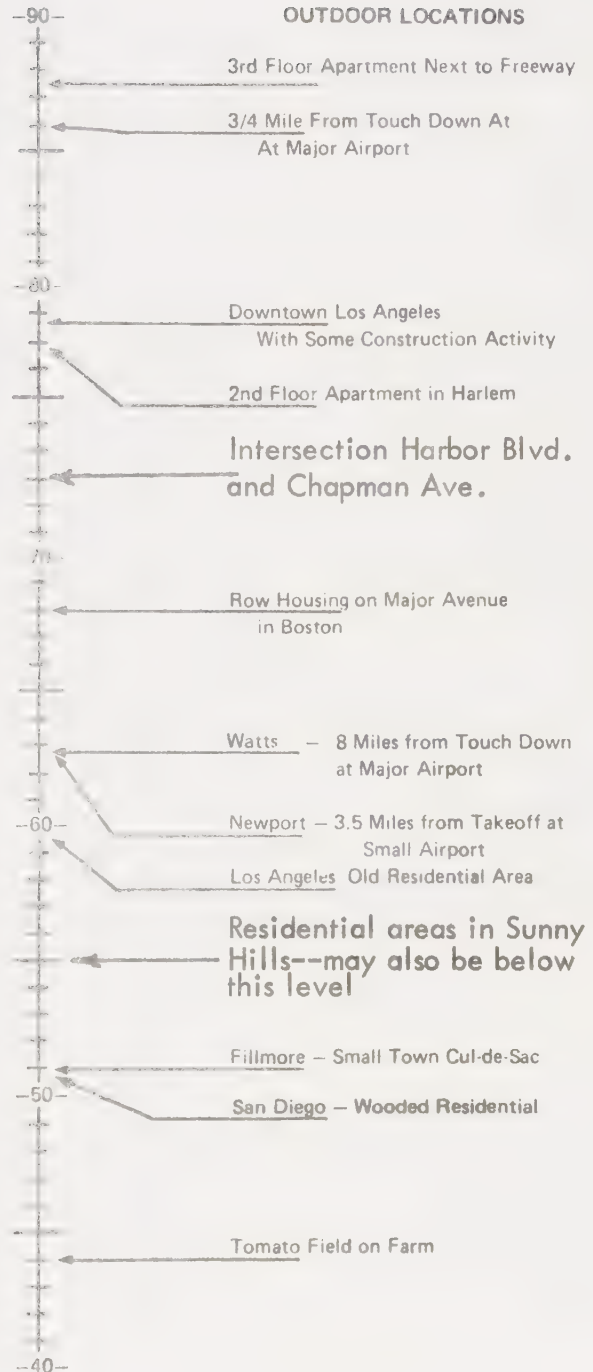


# CNEL

## QUALITATIVE DESCRIPTIONS



## OUTDOOR LOCATIONS



Source: U.S. Environmental Protection Agency, Reference 7.

TABLE II: OUTDOOR COMMUNITY NOISE EQUIVALENT LEVEL (CNEL)  
AT TYPICAL LOCATIONS

TABLE III: LAND USE SUIV - NOISE IMPACT AREAS

|                                                            | CML |    |    |    |    |
|------------------------------------------------------------|-----|----|----|----|----|
|                                                            | 35  | 50 | 55 | 70 | 80 |
| Residential- Single Family Duplex, Mobile Homes            |     |    |    |    |    |
| Residential- Multiple Family                               |     |    |    |    |    |
| Transient Lodging                                          |     |    |    |    |    |
| School Classrooms, Libraries, Churches                     |     |    |    |    |    |
| Hospitals, Nursing Homes                                   |     |    |    |    |    |
| Auditoriums, Concert Halls, Music Shells                   |     |    |    |    |    |
| Sports Arenas, Outdoor Spectator Sports                    |     |    |    |    |    |
| Playgrounds, Neighborhood Parks                            |     |    |    |    |    |
| Golf Courses, Riding Stables, Water Recreation, Cemeteries |     |    |    |    |    |
| Office Buildings, Personal, Business and Professional      |     |    |    |    |    |
| Commercial- Retail, Movie Theaters, Restaurants            |     |    |    |    |    |
| Commercial- Wholesale, Some Retail, Ind., Mfg., Utilities  |     |    |    |    |    |
| Livestock Farming, Animal Breeding                         |     |    |    |    |    |
| Agriculture (Except Livestock), Mining, Fishing            |     |    |    |    |    |
| Public Right-of-way                                        |     |    |    |    |    |
| Extensive Natural Recreation Areas                         |     |    |    |    |    |

## INTERPRETATION



**CLEARLY ACCEPTABLE**  
The noise exposure is such that the activities associated with the land use may be carried out with essentially no interference from noise.



**NORMALLY ACCEPTABLE**  
The noise exposure is great enough to be of some concern, but common building construction will make the indoor environment acceptable, even for sleeping quarters.



**REQUIRES SOUND CONTROL MEASURES**  
The noise exposure is significantly more severe so that in new units unusual and costly building construction is necessary to meet State noise insulation standards to insure adequate performance of activities in residential areas, barriers or landscaping to be erected between the site and prominent noise sources to make the outdoor environment tolerable.

## NOISE SOURCES AND EXPOSURE CONTOURS

Transportation noise is experienced, to some degree, throughout the City. Noise, having significant magnitude, is generated by highway traffic and light aircraft operations from Fullerton Municipal Airport. From the noise measurements, complementing analytical procedures and traffic projections to 1984, noise exposure contours have been derived from the City and noise impact zones identified. Secondary sources of noise and the impact of these contours on land use planning is discussed in the Section entitled "Sources, Impact and Mitigation" of this study.

### A. Community Noise Equivalent Level (CNEL) Contours

CNEL contours have been derived accounting for each of the transportation noise producing elements within the City. The results of combining the noise measurements and analytical procedures is the CNEL Contour Map, Table IV. As indicated in the legend of Table IV contours are provided for CNEL values from 55 to 75 dB in 5 dB increments. The zone contained within the 65 dB contour is identified as the "Noise Impact Zone". The contours provide exposure levels for the projected (1984) environment.

### B. Yearly Increase of the CNEL Values

The contours of equal CNEL values, Table IV, provide noise exposures for a ten (10) year traffic projection within the City. However, increases in CNEL values over this next ten (10) year period due to traffic generated noise, will be minimal. Table V provides the amount of dB by which CNEL values will increase with increased traffic. The increases of from 1 to 1 1/2 dB are not considered significant. Hence, the projected CNEL values are nearly equal to those now existing within the City.

### C. Variation of Noise Level

In general, the noise level variation with time-of-day was found to be similar to that experienced in most populated urban areas with the exception of the train noise which is unique to the City and locations along the right-of-way. The variation in noise level within the City approximately follows the hourly variation in traffic volume. Table VI provides a typical noise level variation relative to the peak traffic hours (7:00 A.M. to 9:00 A.M. and 4:00 P.M. to 6:00 P.M.) for the major arterials within the City.







# LEGEND

55 - CNEL

60

65

70

75

75

65

60

55

LAND USE FOR RESIDENTIAL SPACES

NORMALLY ACCEPTABLE

REQUIRES SOUND CONTROL MEASURES

NORMALLY ACCEPTABLE

City of Fullerton  
**CNEL CONTOURS**  
 FOR THE 1984 TRANSPORTATION  
 ELEMENTS







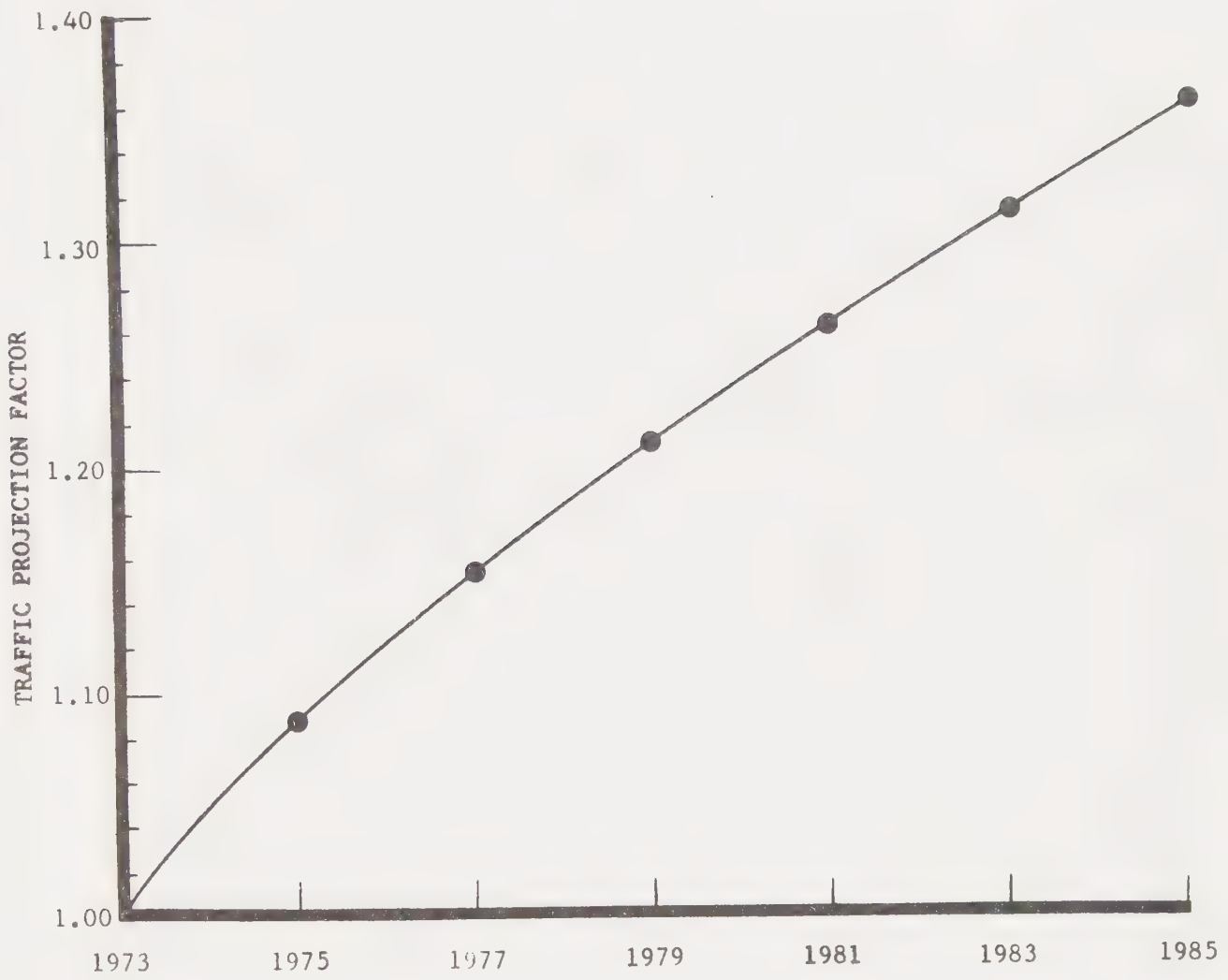


TABLE V: TRAFFIC PROJECTION FACTOR AND CORRESPONDING CNEL INCREASE

Peak Traffic Period

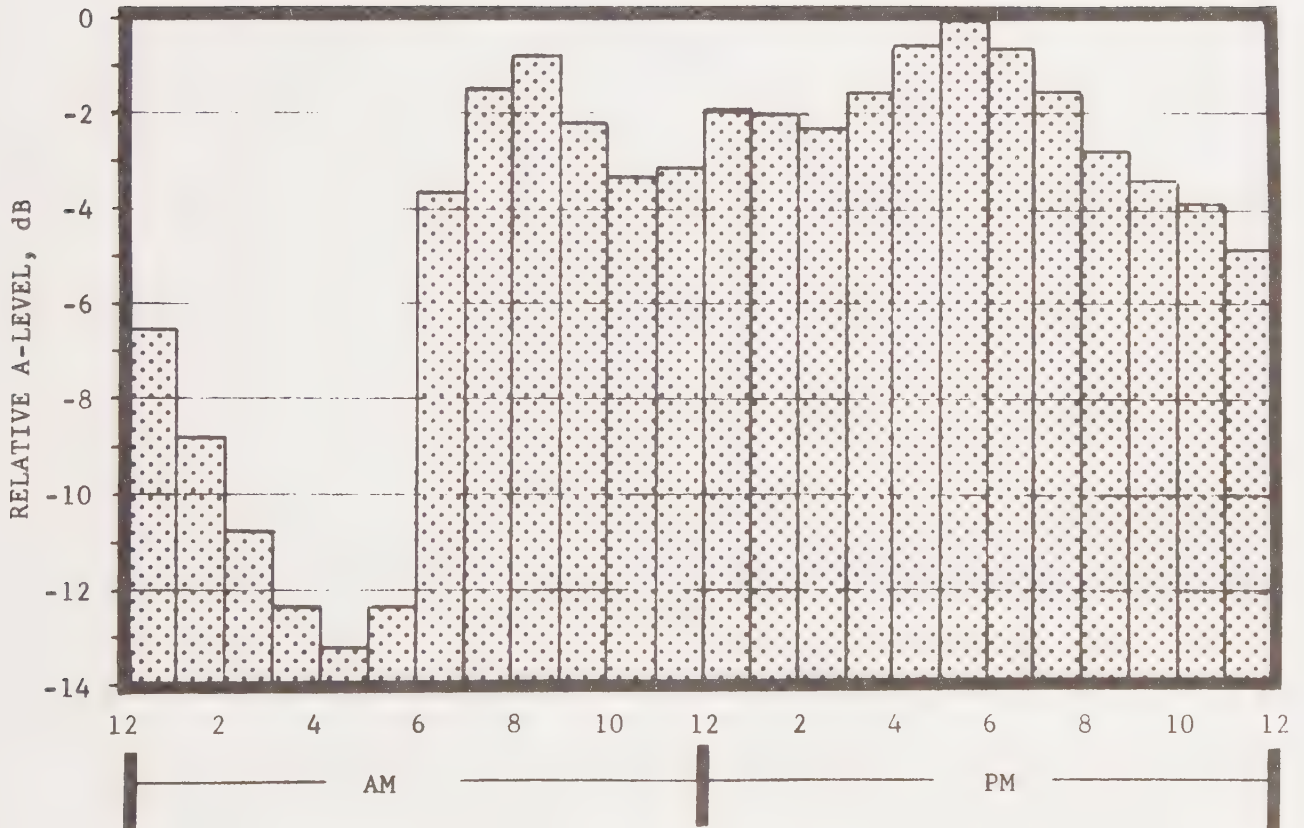


TABLE VI: TYPICAL NOISE LEVEL VARIATION WITH TIME-OF-DAY AT LOCATIONS NEAR THE ARTERIALS WITHIN THE VALLEY

## SOURCES, IMPACT AND MITIGATION

Table VII provides a description of the various noise producing activities and noise sensitive areas within the City. The impact of each source is identified and, where considered necessary and possible, mitigating procedures for reducing the noise impact are indicated. Representative graphic level recordings of noise measurements for each of the transportation noise sources and for the locations where noise may be a potential problem are included as Tables VIII and IX. The representative noise source and/or noise sensitive areas selected are categorized as follows:

- A. Riverside and Orange Freeway Traffic Noise.
- B. Train Movements along the Santa Fe Railway and Spur Lines.
- C. Fullerton Municipal Airport Flight Operations.
- D. Construction Activity.
- E. Commercial/Industrial Noise Producing Elements.
- F. Schools, Hospitals and Parks.



TABLE VII NOISE SOURCES, IMPACT AND MITIGATION - CITY OF FULLERTON

| Source/Activity Category                                         | Source Description                                                                                                                                 | Impact                                                                                                                                                                               | Mitigation                                                                                                                                                                                                                                |
|------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A.<br>Riverside and Orange Freeway Traffic Noise.                | Freeway traffic noise levels at residential setbacks from the freeway fence (about 40 feet) are about 73 dB(A) with peak noise levels to 77 dB(A). | CNEL values at residential locations bordering the freeway exceed 65. Recognized standards indicate that these exposures are excessive unless mitigating measures are taken.         | Implementation of State noise and insulation standards and encourage State construction of noise buffers.                                                                                                                                 |
| B.<br>Train movements along the Santa Fe Railway and Spur Lines. | Train noise levels approach 80 to 90 dB(A) at residential locations bordering the right-of-way. Switchyard activity approaches 100 dB(A).          | Noise levels at residential locations are excessive. Recognized standards are exceeded. The primary annoyance to residents involves the late night and early morning train pass-bys. | Creation of noise barriers--encourage railroads to participate.                                                                                                                                                                           |
| C.<br>Fullerton Municipal Airport Operations.                    | Peak Noise Levels at locations to the east and west of the runway exceed 80 dB(A).                                                                 | Impact of aircraft operations is not considered significant, except at a few residential locations. Growth of activity may have an adverse impact depending upon types of aircraft.  | Limit increases in late evening and early morning operations at the airport. Analyze effect any increased activity will have upon noise levels and limit such effect.                                                                     |
| D.<br>Construction Activity.                                     | Noise level of construction operations approach 100 dB(A) at distances to 50 feet and about 80 dB(A) at locations to 500 feet.                     | Minimal impact for two or three months of activity during daytime hours.                                                                                                             | Heavy construction should be limited to the week-day hours, from 7:00 a.m. to 6:00 p.m. with minimal activity on week-ends. Noise of construction equipment should be considered in the procurement of equipment by the City Departments. |
| E.<br>Commercial/Industrial Noise Producing Elements.            | Carwash facilities and industrial air conditioning equipment may produce noise levels to 75 dB(A) at near-by residential locations.                | In general, commercial/industrial noise within the City is not considered excessive.                                                                                                 | The adoption of a noise ordinance will minimize fixed sources of noise. Delivery hours should be limited where activity will affect residential areas.                                                                                    |
| F.<br>Schools, Hospitals, and Parks.                             | Noise at these locations is generated by traffic on the arterials adjacent to the spaces or facilities.                                            | In general, the noise levels at most locations of concern is not considered excessive.                                                                                               | Noise ought to be a consideration in the selection or relocation of school sites within the City.                                                                                                                                         |

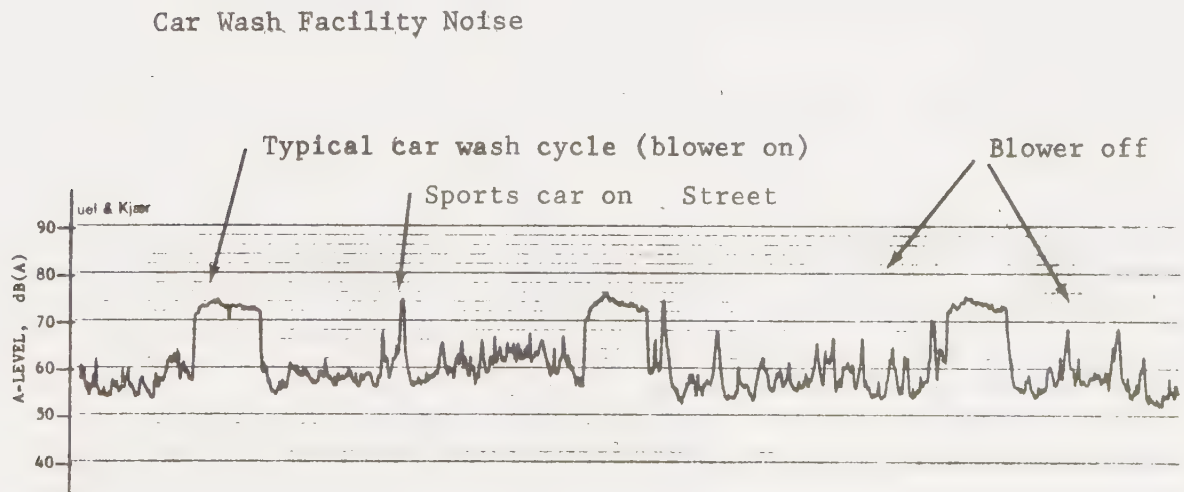
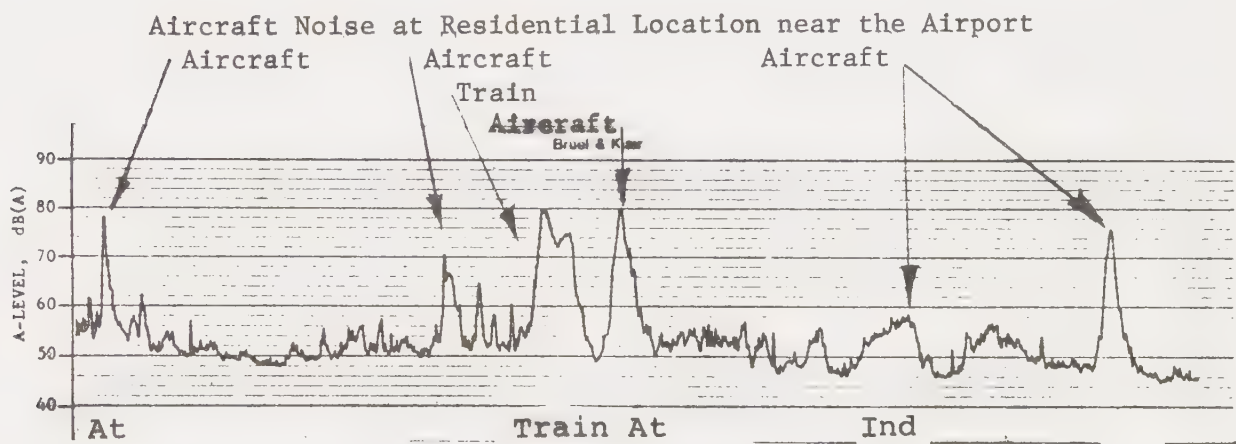
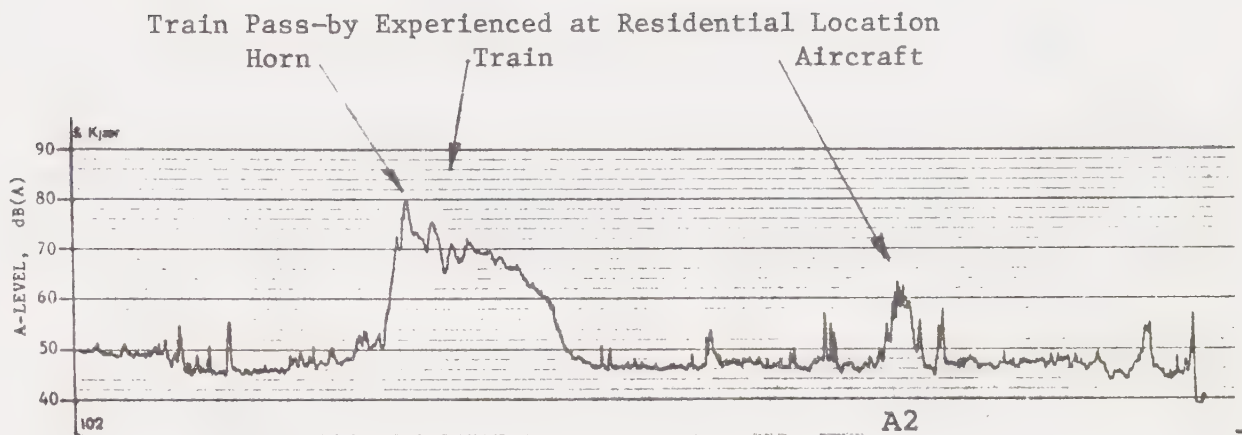
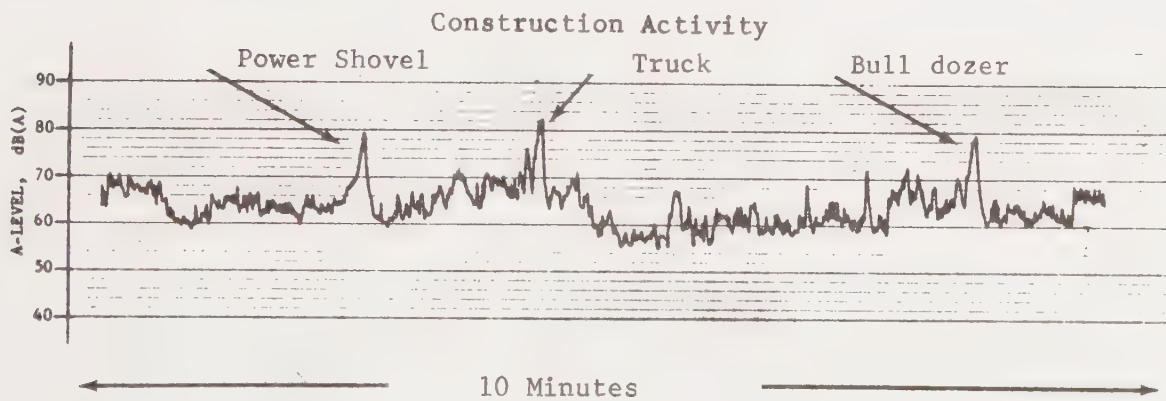
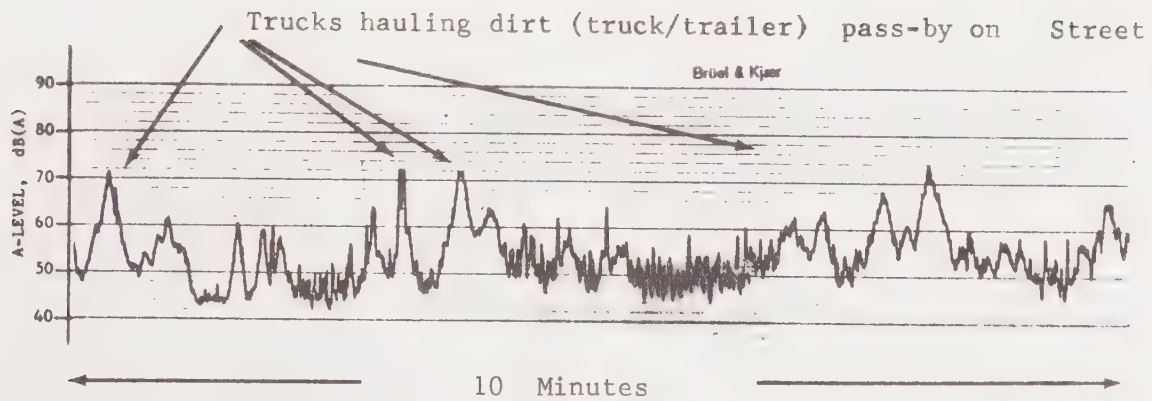


TABLE VIII: REPRESENTATIVE NOISE LEVEL SAMPLES



CONSTRUCTION EQUIPMENT NOISE LEVELS  
(measured at a distance of 50 feet)

| Equipment          | Noise Level | Equipment       | Noise Level |
|--------------------|-------------|-----------------|-------------|
| Earthmoving        |             | Stationary      |             |
| front loader       | 79 dB(A)    | pumps           | 76 dB(A)    |
| backhoes           | 85          | generators      | 78          |
| dozers             | 80          | compressors     | 81          |
| tractors           | 80          |                 |             |
| scrapers           | 88          | Impact          |             |
| graders            | 85          | pile drivers    | 101         |
| truck              | 91          | jack hammers    | 88          |
| paver              | 89          | rock drills     | 98          |
|                    |             | pneumatic tools | 86          |
| Materials Handling |             | Other           |             |
| concrete mixer     | 85          | saws            | 78          |
| concrete pump      | 82          | vibrator        | 76          |
| crane              | 83          |                 |             |
| derrick            | 88          |                 |             |

TABLE IX: CONSTRUCTION ACTIVITY NOISE



## IMPLEMENTATION ACTIONS AND POLICIES

To prevent increases and where possible reduce the exposure of the community to noise, the following actions and policies shall govern the implementation of the City of Fullerton's noise reduction program.

### A. Actions

- ... Develop a program of noise abatement and control of the commercial/ industrial activities within the City, such that intrusive noise is limited to acceptable standards (refer to Table III).
- ... Adopt a noise regulation which uses the A-level of noise measurement and does not permit intrusive noise to exceed acceptable standards.
- ... Insure that the requirements of California's new noise and energy insulation standards are met in all new residential development.
- ... Encourage the California Department of Transportation Division of Highways to expand their noise barrier program to include freeways in this area.

### B. Policies

- ... Control the use of Fullerton Municipal Airport so that no significant additional noise is produced due to aircraft operations.
- ... Establish contact with the Santa Fe Railroad to determine if their method of operation can be modified in any way to reduce excessive noise, especially in nighttime switching operations, and also to jointly participate in the construction of suitable noise barriers to protect residential spaces.
- ... Encourage the enforcement of State Vehicle Code Noise Standards for cars, trucks, and motorcycles operating within the City.
- ... Require all City Departments to consider noise control requirements in the procurement of equipment.



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